REMARKS

Claim 8 has been cancelled, and claims 1-7 amended to more definitely set forth the invention and obviate the rejections. In addition, new claims 9-18 have been presented. Support for the amendment of claims 1-7 can be found in the Specification on page 9, third paragraph. Support for new claims 9-19 may be found in the Specification on page 2, line 21, through page 7, line 19, and page 11. The present amendment is deemed not to add new matter. Claims 1-7 and 9-19 are in the application.

Reconsideration is respectfully requested of the rejection of claims 1-6 under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Ravinovitch, et al. (US 4,424,292).

The cited Ravinovitch, et al. reference concerns infrared reflecting vinyl polymer compositions containing black infrared reflecting pigment, for use in application thereof onto vinyl house siding. In particular, the compositions disclosed by Ravinovitch, et al. are comprised of a main vinyl polymer and an infrared reflecting pigment.

In contrast, the present invention as now claimed in claims 1-7 provides a heat radiation shield plate comprising a metal substrate and a heat radiation shield coating film coated thereon. This heat radiation shield coating film contains a black

pigment, a binder, a curing agent, and a solvent. In addition, the black pigment has a reflectance of not below 8% relative to a solar radiation in the 780 - 2,100 nm wavelength region.

Further, new claims 9-18 presented herewith provide a heat radiation shield coating composition comprising 0.1 wt% or more black pigment, a binder component, and a curing agent. There is no disclosure, teaching or suggestion thereof in the Ravinovitch, et al. reference of the combinations of elements now claimed herein, as recited above.

With regards to the Examiner's comments concerning the inherent characteristics of the composition of Ravinovitch, et al., in relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the prior art. *Ex parte Levy* 17 PQ2d 1461 (BPAI 1990). In the present case, it is not believed that the Examiner has provided such a basis in fact and/or technical reasoning. Thus, it is believed that the Examiner is not justified at this time in relying upon such a theory as a basis for the rejection.

In addition, As shown on pages 10-12, 8 different black pigment compositions were prepared by the present inventors (designated as Black Pigment A-H), and each of said pigments were

dispersed in a binder at a composition of 20-40 parts by weight, so as to obtain a coating film. Thereafter, the spectral reflectance of each coating film, containing black pigments A-H, respectively, was measured by a Hitachi Seisakusho spectrophotometer in the 780 - 2,100 nm near infrared region. Based on the measured reflectances in this near infrared region, the solar radiation reflectance of each black pigment was calculated according to the procedure described in JIS A 5759, which is shown on page 12, lines 17-24.

Then, as described in Example 1, a coating composition was prepared as described on page 13, first paragraph, and was coated on an aluminum substrate test piece. Thereafter, said test piece was measured for Munsell system dimensions and gloss. Further, spectral reflectance was measured to calculate the solar radiation reflectance of the test piece, from which the solar radiation reflectance of the coating film was calculated.

In addition, the heat radiation shielding ability of coating compositions was measured as described on page 14, line 8, to page 15, line 7. In essence, this is a temperature measurement test, measuring the heat shielding/insulating ability of the coating composition, in preventing heat transfer from solar radiation across the substrate to which the coating composition is applied.

Thereafter, various coating compositions were prepared, as described in Examples 2-12, and Comparative Examples 1-12, and the measurements described above in Example 1 carried out on said coating compositions. The results of these tests are shown in Tables 1 and 2.

Upon completion of these comparative tests, the present inventors unexpectedly discovered that the combination of black pigment, binder and curing agent, as now claimed in claims 9-18, provide much higher solar radiation reflectance values in the 780 - 2,100 nm wavelength region, and much improved solar radiation shielding capabilities, as compared the compositions of comparative examples 1-12. The results of these comparative tests are illustrated in Tables 1 and 2, as well as Figs. 1 and 4.

In particular, it was unexpectedly discovered that application of the composition of the present invention onto the exterior of a structure (in the comparative tests a box was used) provides unexpectedly improved insulating properties as compared to the prior art coating compositions when the structure is subjected to UV/heat radiation, i.e., the exterior of a building coated with the coating composition of the present invention containing a black pigment comprised of Fe_2O_3, and Cr_2O_3 and/or MnO_2, with a binder and curing agent as described herein, can absorb and/or reflect a higher degree of solar radiation when

applied to a metal substrate without a subsequent increase in the interior temperature of the building, as compared to conventional heat shielding/solar reflecting coating compositions when same are applied to a metal substrate such as aluminum or zinc plated steel.

In view of the deficiencies of the Ravinovitch, et al reference, as well as the unexpectedly improved results of the coating composition of the present invention described above, it is believed that the Ravinovitch, et al. reference fails to anticipate or render unpatentably obvious the claims as now amended herein. Withdrawal of the rejection is accordingly respectfully requested.

Reconsideration is respectfully requested of the rejection of claims 1-6 under 35 U.S.C. §102(b) by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Modly (US 4,624,710).

The cited Modly reference is concerned with a gray vinyl polymer material having improved tolerance to sunlight, which contains an inorganic pigment composed of chromium oxide and iron oxide. The Modly reference discloses neither the coating composition composed of the combination of black pigment, binder and curing agent as now claimed herein, nor a heat radiation shield plate comprised a metal substrate coated with said coating composition. Rather, that teaching comes only from the present

invention, and constitutes an important element or aspect thereof.

With regards to the Examiner's comments pertaining to the inherency of the characteristics of the high IR black pigments of the cited reference, the Examiner has provided no scientific teaching or basis upon which to base such claim. In view of the legal authority cited above, it is believed that reliance upon such theory is unjustified at this time.

Further, with regards to the preamble, the claims have been amended to claim the recited solar radiation reflectance values in the body of the claims. It is believed that Modly fails to disclose or suggest such limitations.

In view of the deficiencies of Modly as discussed above, the legal authority discussed above, and the amendments made to the claims herein, it is believed that the Examiner would be justified in no longer maintaining the rejection. Withdrawal of the rejection is accordingly respectfully requested.

Reconsideration is respectfully requested of the rejection of claims 1, 2 and 4-6 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Allingham (US 4,895,904).

The cited Allingham reference relates to polymer sheets or films for use in greenhouses. These sheets or films are comprised

of a polymer incorporating a UV radiation stabilizer. In particular, certain metal powders or metal oxides, in fine particle form, such as coated copper powder, are used in the polymer sheets to reflect or absorb UV radiation.

In contrast, the present invention, as described in the response to the previous rejection, provides a heat radiation shield plate coated with a coating composition containing a black pigment, a binder, a curing agent and a solvent. Further, the present inventors unexpectedly discovered that such a coating composition, when applied to a metal substrate, provides exceptionally good heat shielding/insulation properties, thus maintaining a steady, comfortable temperature within buildings during daylight hours even in areas of intense sunlight.

Further, as in the 2 previous rejections discussed above, it is believed that the inherency theory relied upon by the Examiner is unjustified at this time, as no basis in fact and/or technical reasoning has been provided.

Allingham discloses neither the heat radiation shield plate as now claimed herein, nor the coating composition as now claimed, and the inherency of the characteristics of the composition disclosed therein are not a basis upon which to make the rejection as discussed above. Thus, it is believed that the cited Allingham reference fails to anticipate or render

unpatentably obvious the claims herein. Withdrawal of the rejection is accordingly respectfully requested.

Reconsideration is respectfully requested of the rejection of claims 1-6 and 8 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nakamura, et al. (US 5,814,434).

The cited Nakamura, et al. reference relates to an article comprising a substrate and black matrix formed thereon for a liquid crystal display (LCD). In particular, it was an object of Nakamura, et al. to provide a composition containing a black pigment for forming a black matrix on a filter substrate or a display panel of an LC display, a plasma display, a fluorescent display, an LED display, a CRT color display or an LC projector (column 1, lines 21-33). Such composition for the black matrix contains a compound-oxide black pigment composed of at least 2 metal oxides having a spinel or inverse-spinel crystalline structure.

In contrast, the present invention concerns a heat radiation shielding plate and a coating composition for application upon the exterior of buildings, vehicles, ships, plants, sheds, cattle stalls and the like, to shield the structures from interior temperature rise due to heat radiation. The present invention achieves such object by providing a metal substrate with a

coating composition provided thereon comprised of a black pigment, a binder, a curing agent and a solvent.

Further, as discussed above, it is believed that the inherency theory fails as a matter of law, in view of the above cited authority

The invention disclosed in Nakamura fails to disclose the now claimed combination of elements. In fact, the invention of Nakamura, et al. is in an unrelated field, and fails to teach or suggest applying the composition therein to the applications provided for in the present invention. Further, in the absence of any such teaching or suggestion, it is believed that it would not have been obvious to one of ordinary skill in the art at the time the present invention was made to apply the composition of Nakamura, et al. to the exterior of a structure to shield same from heat radiation.

In view of the deficiencies of Nakamura, et al., as well as the unexpected results of the present invention as discussed above, it is respectfully submitted that Nakamura, et al. fail to anticipate or render unpatentably obvious the claims herein. Withdrawal of the rejection is accordingly respectfully requested.

Reconsideration is respectfully requested of the rejection of claims 1-8 under 35 U.S.C. 103(a) as being unpatentable over

Piana (US 5,739,204) or O'Neil (US 6,207,224) in view of Ravinovitch, et al. (US 4,424,292), Allingham (US 4,895,904) or Modly (US 4,624,710).

The Ravinovotch, et al., Allingham and Modly references are discussed above.

The Piana, et al. reference provides a heat-curable coating composition suitable for the formation of hard and flexible layers on metal objects. These heat-curable coating compositions are comprised of polyesters, cross linking agents, solvents and OPTIONALLY pigments.

The Piana, et al. reference, however, fails to disclose the % reflectance relative to solar radiation in the near IR range, as claimed herein. Furthermore, it is believed that Piana, et al. fail to teach or suggest the combination of metal oxides in the weight percents now claimed herein, which constitutes an important element or aspect of the present invention.

The cited O'Neil reference concerns a process for coating thermoplastic substrates, such as plastic parts on vehicles, etc., with a coating composition containing a solvent that will not damage the substrate upon which the composition is applied to. As in Piana, et al. there is no disclosure of applying the composition to structures to shield same from heat radiation, no disclosure of a coating composition applied to a metal substrate

to form a heat radiation shield plate, and no teaching or suggestion of the solar radiation reflectance and heat radiation shielding characteristics of the heat radiation shield and coating composition of the present invention.

In order for a combination of references to render an invention obvious, it must be obvious that their teachings can be combined. *In re Avery* 518 F2d 1228, 186 USPQ 161 (CCPA 1975). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. *In re Geiger* 815 F2d 686, 2 USPQ 1276 (CAFC 1987); *In re Fine* 837 F2d 1071, 5 USPQ 1596 (CAFC 1988).

Neither the primary O'Neil reference nor the primary Piana reference discloses the claimed combination of elements herein. Furthermore, the inventions described in said primary references are in fields unrelated to the present invention, and provide no teaching or suggestion to apply said compositions to the field application of the present invention.

In addition, the secondary Ravinovitch, Allingham and Modly references fail to disclose or suggest the heat radiation shield plate and coating composition having the heat radiation shielding characteristics of the present invention, as discussed above in the previous rejections.

It is believed that the cited combination of references fail to render unpatentably obvious the amended claims herein. In view of same, as well as the legal authorities cited above, it is believed that the Examiner would now be justified in no longer maintaining the rejection. Withdrawal of the rejection is accordingly respectfully requested.

In view of the foregoing, it is respectfully submitted that the application is now in condition for allowance, and early action and allowance thereof is accordingly respectfully requested. In the event there is any reason why the application cannot be allowed at the present time, it is respectfully requested that the Examiner contact the undersigned at the number listed below to resolve any problems.

Respectfully submitted,

TOWNSEND & BANTA

Donald E. Townsend
Reg. No. 22,069

Donald E. Townsend, Jr.
Reg. No. 43,198

TOWNSEND & BANTA
1225 Eye Street, N.W.
Suite 500
Washington, D.C. 20005
(202) 682-4727

Date: December 27, 2002

MARKED-UP VERSIONS OF AMENDED CLAIMS 1-7:

1. A heat radiation shield plate comprising:

a metal substrate, and

a heat radiation shield coating film formed by applying a coating composition to said substrate,

said coating composition containing a black pigment which exhibits a reflectance of not below 8.0 % relative to a solar radiation in the 780 - 2,100 nm wavelength region, a binder component, a curing agent, and a solvent.

2. The heat radiation shield plate [coating composition] of claim 1, wherein said black pigment exhibits a reflectance of not higher than 15 % relative to a radiation at any wavelength in the 400 - 700 nm visible region.

3. The [coating composition] heat radiation shield plate of claim 1, wherein said black pigment is a calcined pigment which contains Fe_2O_3 and also Cr_2O_3 and/ or Mn_2O_3 in the total amount of 20 - 100 % by weight.

4. The [coating composition] heat radiation shield plate of claim 1, wherein said black pigment is contained in the amount of not less than 0.1 % by weight.

5. The [coating composition] heat radiation shield plate of claim 1, wherein said black pigment is contained in the amount of not less than 0.5 %, based on the total weight of all pigments.

6. The [coating composition] heat radiation shield plate of claim 1, wherein said coating composition contains a polyester, acrylic, fluoro or chloro resin [is contained] as [a] said binder component.

7. The [coating composition] heat radiation shield plate of claim 6, [further containing] wherein said coating composition contains a melamine resin and/ or blocked isocyanate as said curing agent.